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of about 1800 R. P. M. is used. While plates made in this way are not as good as the imported article they are usable and cheap, and by this means museum jars whose covers have been broken may be put into use.

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GEORGE R. LA RUE.

THE POSSIBLE NATURE OF THE "BOOK LUNGS" OF SPIDERS

The abdomen of spiders is now unsegmented, and yet it is probable that spiders have descended from ancestors whose bodies were segmented throughout.

The breathing apparatus in spiders is varied, some forms showing some development of tracheal tubes. On the forward end of the abdomen are found two sacs, each of which encloses a folded membrane which exposes the blood to the air. These are the book lungs.

In the section of such a lung from an *Aglena* (Plate XX, Fig. 1) the membranous character of the organ will be seen. Red blood cells may be seen between the double membranes. The outer surface of the membrane is covered with short spines, which prevent the moist membranes from adhering.

It is possible that this arrangement is derived from an ancestral form which had external gills at this point, somewhat similar to the tracheal gill membranes of insect nymphs.

A figure of a section of the young wing membranes of an *Ephemera* nymph is shown (Pl. XX, Fig. 2) for comparison. The similarity of structure is striking.

E. W. ROBERTS.

NOTE ON THE NATURE OF THE CYTO-PLASTID

The cyto-plasm of a cell contains unit plastids which themselves bear a great resemblance to a complete cell with its nucleus and cyto-plasm.

Using the Tussock Moth egg for an illustration we get a suggestion of this condition. The egg is filled with nutritive material supplied by numerous nurse cells from their own cyto-some system.

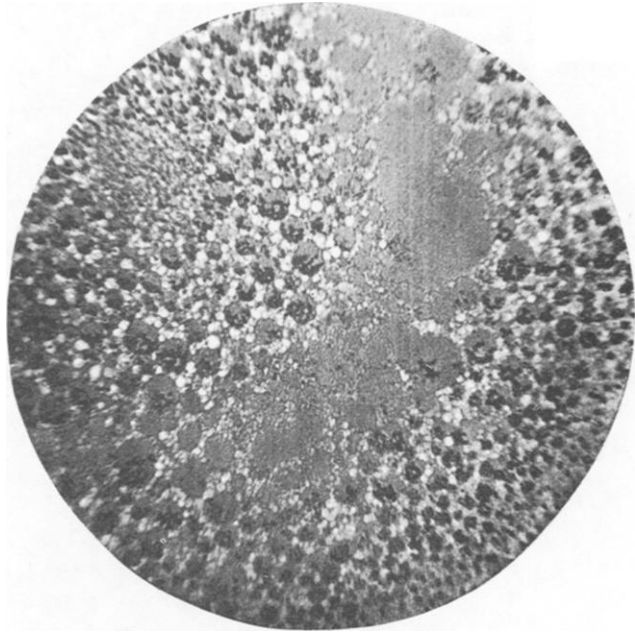


FIG. 1. Cyto plastid in Tussock Moth Eggs.

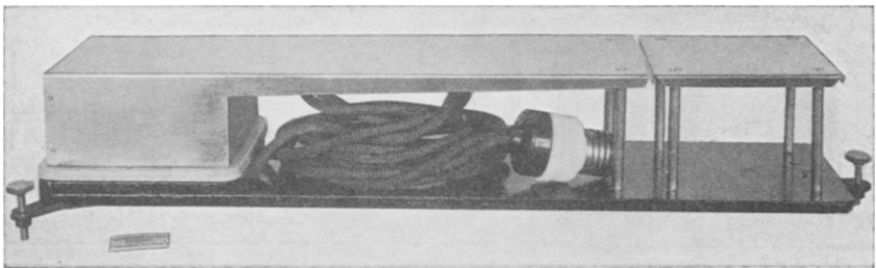


FIG. 2. Electrically heated embedding stage, Eberbach & Co.

Into this mass of raw food material, are extruded from the walls of the oviduct certain granules which stain as nucleo-somes. These appear singly at first as seen at the edges of the photograph (Plate XXI, Fig. 1). These chromatic bodies seem to multiply by binary divisions and thus produce a progeny of various numbers of staining bodies.

These bodies sometimes group themselves into paired threads, and in some cases separate into distinct groups resembling the anaphase of nuclear mitosis. The cyto-plastids thus seem to act as a miniature cell, containing grouped staining bodies, a surrounding body of plasm, and a definite membrane.

These efforts of the staining bodies to divide and to group themselves gives one the impression that the process is a modified or incomplete sequence of what we see in mitotic divisions of the chromosomes, from which they may be derived.

In the lower animals such as Rhizopods and others, the nucleus buds out into the cytoplasm similar bodies, which undergo analogous binary divisions and finally form a large progeny of staining bodies. Later these group and form new nuclei which surround themselves with a plasmic body, about which a new cell wall is formed. In the Tussock egg these processes seem to stop short of this final result, and produce objects whose fate is to be used as food.

E. W. ROBERTS.

SENESCENCE AND REJUVENESCENCE

The fact that an organism at its individual beginning is "young" and gradually loses some of the powers of youth with the passage of time, is so commonplace that its real significance escapes us. The further fact that one of these older organisms can, in spite of its age, produce offspring which apparently do not have the age of the parent, but are as young as the parent originally was at the beginning, brings us acutely upon the problems at the basis of this book. In what does growing old consist? How does age differ from youth? When reproduction takes place, is youth absolutely restored? If so, do the old materials become young again, or is there some material within the aging body which does not itself grow old?